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IS 4410-2 (1967): Glossary of terms relating to river valley projects, Part 2: Project planning [WRD 6: Water Resources Planning, Management and Evaluation]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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(Reaffirmed 2001)

Indian Standard

GLOSSARY OF TERMS RELATING TO
RIVER VALLEY PROJECTS

PART II PROJECT PLANNING

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

Indian Standard

GLOSSARY OF TERMS RELATING TO RIVER VALLEY PROJECTS

PART II PROJECT PLANNING

Terminology Relating to River Valley Projects Sectional Committee, BDC 46

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IS : 4410 (Part II) - 1967

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GLOSSARY OF TERMS RELATING TO RIVER VALLEY PROJECTS

PART II PROJECT PLANNING

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 7 December 1967, after the draft finalized by the Terminology Relating to River Valley Projects Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 A number of Indian Standards has already been published covering various aspects of river valley projects and a large number of similar standards are in the process of formulation. These standards include technical terms and precise definitions for such terms are required for avoiding ambiguity in their interpretation. To achieve this end, the Sectional Committee is bringing out 'Indian Standard glossary of terms relating to river valley projects (IS : 4410)' which will be published in parts. This Part [IS : 4410 (Part II)-1967] contains definitions of terms relating to types of projects, preliminary investigations and surveys, types of reports, economic aspect of project planning, estimates and contracts.

0.3 In the formulation of this standard due weightage has been given to international co-ordination among standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country. This has been met by deriving considerable assistance from 'Multilingual technical dictionary on irrigation and drainage' published by the International Commission on Irrigation and Drainage (ICID) and other sources. The definitions taken from the 'Multilingual technical dictionary on irrigation and drainage' are marked with an asterisk.

1. SCOPE

1.1 This glossary contains definitions of terms relating to types of projects, preliminary investigations and surveys, types of reports, economic aspect of project planning, estimates and contracts.

2. TERMS RELATING TO TYPES OF PROJECTS

2.1 Combined Flood Control Project — A project in which several flood control methods are utilized jointly.

2.2 Drainage Project — A project meant for leading away or disposal of surplus or waste surface or subsurface water.

2.3 Flood Control Project* — A project meant either solely or primarily for flood control purposes, although in the latter case it may incidentally serve other purposes. It may utilize one or several of the flood control methods.

2.4 Hydro-Electric Power Project* — A project meant solely or primarily for hydro-electric power generation, although in the latter case it may incidentally serve other purposes.

2.5 Individual Project* — A single or multi-purpose project, without consideration of the integrated river basin development.

2.6 Irrigation Project* — A project meant either solely or primarily for irrigation purposes, although in the latter case it may incidentally serve other purposes.

2.7 Multi-purpose Project* — Project, designed, constructed and operated to serve two or more interests or purposes namely, flood control, hydro-electric power generation, navigation, irrigation, fisheries, public water supplies, recreation, etc. It may be individual project, or a part, planned or improvised, of an integrated river basin development.

2.8 Navigation Project* — A project meant solely or primarily for navigation purposes, although in the latter case it may incidentally serve other purposes.

2.9 River Valley Project* — Project directed to developing, controlling or utilizing water resources of a river basin.

3. TERMS RELATING TO PRELIMINARY INVESTIGATIONS AND SURVEYS

3.1 Aerial Photograph* — Any view of a portion of the earth's surface taken from a position above the ground.

3.2 Aerial Photogrammetry — Preparation of plans and maps with the help of aerial photograph.

3.3 Aerial Survey — A survey utilizing aerial photographs.

3.4 Agricultural Investigations — Investigations and studies including land and soil classification, land use practices, agricultural practices,

IS : 4410 (Part II) - 1967

farm labour statistics, data on consumptive use by crops, crops and crop pattern, soil moisture, available water resources and ground water conditions.

3.5 Available Water Supply* — In water resources development projects, the total quantity of water available from the source within a certain time period, usually a year, and the rate of availability at any time within a year.

3.6 Base Line — Line established in triangulation survey for reference, co-ordination and correlation. This is the only line whose length is actually measured in the survey and the accuracy of the survey will depend on the accuracy of measurement of this line.

3.7 Basin Surveys — Surveys for obtaining basin contours for determination of capacity and geological logging of basin and to examine possibilities of sources of leakages.

3.8 Cadastral Survey — Survey for the purpose of showing the extent, value and ownership of land for taxation, etc. Derived from the word *cadastré* (French) meaning register of the real property with details of area, ownership and value.

3.9 Construction Material Survey — Quantity, quality survey of materials required for construction. This includes field and laboratory testing, economics of quarrying or salvaging, handling and transportation.

3.10 Construction Schedule — See 3.14.

3.11 Construction Surveys* — This term refers to all types of surveying activities which are performed in connection with any construction operation or which are necessary immediately prior to the start of construction or during construction. These include surveying operations in connection with all types of excavation, embankment, placing, structure erection and machinery installation.

3.12 Contour Interval* — The difference in elevation between adjacent contours on a map.

3.13 Controlled Aerial Mosaic — An assembly of aerial photographs matched to form a continuous photographic representation of a portion of the earth's surface, oriented and scaled to horizontal ground control points.

3.14 Control Schedule* — A summary programme by which a project is broken into its principal features and shows in what years the work on each feature will be done and gives an estimate of the cost of that work for each year. It is also called 'Construction Schedule'.

3.15 Control Survey — A survey to provide permanent/semi-permanent and accessible planimetric and/or height control points, which are used as reference framework for other surveys in the area.

3.16 Definite Project Plan* — The planning stage following detailed investigations and comprising (a) structural or hydraulic model studies and exploratory work, if required; (b) preparation of a plan with a complete layout and dimensions of all structures and with specifications ready for construction of the project. It includes all necessary data, hydrologic, geologic, structural and economic, to support the plan of development, the layout and dimensions of structures, the layout of construction plants and facilities; the specifications of materials and methods of construction, up-to-date estimates of benefits and costs, the system of cost allocation and repayment, if any, water charges, requirements of experts and of skilled and unskilled labour, of materials (indicating what are local, domestic or foreign origin), and of equipment and machinery (indigenous and imported and the year-wise requirements and domestic and foreign currencies), schedule of programme of execution, the contemplated regulation of rules for operation.

3.17 Detailed Investigations* — The investigations following reconnaissance and comprising collection of necessary physical data, hydrologic, geologic, topographical and structural, to give engineers the basis of planning and estimation; collection of data about flood damages, land use, marketing of power, population, habits of water consumption, volume of water available for use, traffic surveys and facilities as well as comparative cost of transport between railroad and waterways, and the expected social and economic impact of the development, financial and economic studies, requirements of experts and of skilled and unskilled labour, of materials (indicating which are of local, domestic or foreign origin), and of equipment and machinery (indigenous and imported), the overall cost in domestic and foreign currencies, and preparations of estimates of costs.

3.18 Detail Location Surveys* — Surveys for the location of roads and railways, or of major features including dams, spillways power and pumping plants, towns, tunnels, siphons and other structures.

3.19 Detail Schedule* — Tabulation which takes the work on the control schedule for the current year, lists the features under construction, and breaks them down into all important subfeatures.

3.20 Engineering Surveys* — Surveys (field or ground surveys, aerial surveys, preparation of maps and charts) executed or to be executed for the purpose of obtaining information for planning an engineering project or development and estimating its cost. The information obtained or

IS : 4410 (Part II) - 1967

to be obtained may, in part, be recorded in the form of engineering map or plant.

3.21 Geochemical and Geothermal Water Surveys* — Surveys to determine the nature of and variations in the chemical character of ground water of the area and also the temperature of the ground water.

3.22 Geological Survey — A survey or investigation of the character and structure of the subsurface at a site to determine the suitable stratum on which any important structure can be founded and small include such survey or investigation as may be necessary to explore the availability of materials required for the construction of those structures.

3.23 Geophysical Survey* — The exploration of an area in which geophysical properties and relationship unique to the area are mapped by one or more geophysical methods. In ground-water exploration relating to particular localities, this survey would give specific information as to the depth and extent of ground-water bodies which are determined by recognizable lithological and stratigraphic changes.

3.24 Geohydrological Investigation — See 3.26.

3.25 Ground Surveyor or Field Survey* — A survey made by ground method (as distinguished from an aerial survey) and includes control surveys, cadastral surveys, topographic surveys and location surveys. A ground survey may or may not include the use of aerial photographs for preliminary research or check purposes. Also called 'Land Survey'.

3.26 Ground-Water Investigations* — Investigations of ground water resources regarding their occurrence, movement, storage, discharge, quality and their appraisal to determine the quantity they can yield. Also called 'Geohydrological Investigation'.

3.27 Horizontal Photograph* — Photograph made with the camera axis horizontal.

3.28 Hydrographic Survey* — An instrumental survey to measure and determine characteristics of streams and other bodies of water within an area, including such things as location, aerial extent, and depth of water in lakes or ocean; the width, depth, and course of streams; position and elevation of high water marks; location and depth of wells; etc.

3.29 Hydrological Data* — In reference to water resources development, this term refers to data on precipitation, river stages, river discharges, sediment transportation both suspended and bed load, yield and storage of ground water, evapo-transpiration, valley storage maximum flood levels and discharges and the quality of water as well as other related metrological data, such as temperature.

3.30 Hydrological Investigation* — Collection including methods and techniques used and installation of further data collection stations, of hydrological data and appraisal of available water supply for various phases of water resources development and appurtenant works and operations related thereto including the determination of the extremes, such as floods and droughts. Also called 'Hydrological Studies'.

3.31 Hydrological Studies — *See* 3.30.

3.32 Land Survey — *See* 3.25.

3.33 Level Control — *See* 3.70.

3.34 Mosaic — An assemblage of aerial photographs.

3.35 Multi-lens Photograph* — Photograph made by a multi-lens camera, the axes of the different chambers being symmetrically arranged about a vertical axis so as to cover wide fields at the simultaneous exposure in all chambers. A combined photograph may be formed by projecting the oblique views into a plane perpendicular to the axis of the camera unit and then mounting all views in such relation to one another that the equivalent of a very wide-angle, single-lens photo results.

3.36 Oblique Photograph* — An aerial photograph taken with a camera with the axis at an appreciable angle to the vertical, generally at 45° or more. A high oblique photograph is one that includes the horizon; a low oblique photograph does not include the horizon.

3.37 Partially Developed Underground Water Basin* — An underground water basin wherefrom the use of underground water does not exceed the naturally occurring re-charge but a considerable development, either agricultural or urban, dependent on the use of underground water has taken place on the land above.

3.38 Phases of Water Resources Development* — The various aspects of development from available water resources, such as irrigation, flood control, navigation, domestic and industrial water supply, hydro-electric power, drainage and watershed management. It also means the stages of development of the water resources for single or manifold purposes, with reference to time.

3.39 Photogrammetry — The science or art of obtaining reliable measurements from a set of photographs.

3.40 Physical Data* — In reference to planning and development of water resources project, this term includes hydrological and topographical information, cadastral survey, geology of the area and data on soils, sedimentation vegetation, marine and wildlife.

IS : 4410 (Part II) - 1967

3.41 Post-Construction First Sedimentation Survey — The first survey conducted in a storage work after construction for estimating the amount and distribution of sediment deposited in the reservoir.

3.42 Post-Construction Survey* — A survey made after the completion, or partial completion, of a structure or a physical feature of a project. In general, such surveys fall into two main classes: (a) record for as-built drawing or as executed; and (b) surveys to determine and record the behaviour of a structure following its completion.

3.43 Pre-construction Survey* — A survey required to obtain the necessary data for authorization reports and for contract or final designs of structures or other project works, as well as for the establishment of the area to be benefited by the project.

3.44 Preliminary Location Survey* — Preliminary survey made for the selection of site and preliminary design of various features of a proposed project.

3.45 Preliminary Survey* — The collection of survey data in the early stages of project planning. They are further classed as reconnaissance surveys and preliminary location surveys.

3.46 Programming* — Making or framing programme of work to show (a) what is going to be done, (b) who is going to do it, (c) when it is going to be accomplished, and (d) what is required in the way of money, personnel and supplies to do it.

3.47 Property Survey — It is a cadastral survey which also includes assessment of crops sown, their annual return, trees, forests, if any, and urban property.

3.48 Quality of Water Survey — A survey relating to the quality of water for drinking, irrigation and construction purposes, as also methods of re-charging this water with surface waters.

3.49 Reconnaissance* — Bringing together all readily available socio-economic and physical information, data and facts of a particular area; assimilating data from previous reports and maps; carrying out minimum possible field surveys, if required, consistent with reasonable accuracy; and examining within the shortest possible time all the above information and data with a view to (a) evaluating human or socio-economic factors in the area, their present state, their trends and the corresponding needs and requirements; (b) making a detailed study of development potentials offered by water and other natural resources; and (c) preparing a preliminary general programme of development which for integrated river basin development should outline in general terms the possible alternative water projects and ensure that, whatever priority and timing is chosen for each individually, proper co-ordination

or integration of water development schemes and of water uses will be maintained. Also called 'Reconnaissance Investigation'.

3.50 Reconnaissance Investigation — See 3.49.

3.51 Reconnaissance Survey* — A rapid survey or critical inspection of an area or site made for furnishing data (a) to find out the feasibility and extent of a development project or scheme, (b) to permit preliminary examination of alternative sites and locations, (c) to provide the base maps for preliminary estimates of the extent and location of potential lands, or (d) to derive a preliminary plan on which to base further studies and surveys.

3.52 Reservoir-Sedimentation Survey* — A survey to obtain information on the quality, quantity and distribution of the sediment accumulations in the reservoir formed by the dam and to ascertain the effect of reservoir on the stream channel upstream and downstream.

3.53 Seismicity Survey — A survey to determine the seismic activity of a region. This includes preparation of seismic status maps to indicate the possible susceptibility and anticipated response of the substrata to seismic waves, with the help of existing geological data in regard to the tectonic, stratigraphy and lithology of the rock type and other data, such as epicentres and magnitudes of past earthquakes occurring in the region, study of micro-tremours and predominant period of site.

3.54 Snow Survey — A set of measurements of the depth and density of snow, usually made to determine the water stored on a drainage basin in the form of snow as a method of forecasting the subsequent runoff.

3.55 Socio-economic Data* — In reference to planning and development of a water resources project this term includes overall basic economic data (population distribution, income employment, production) and functional data, such as relating to agriculture, forestry, fishing and trapping, manufacturing, mining, recreation, transportation, power demand, damages from floods, tornadoes, windstorms and coastal erosion and information on water supply, its pollution and public health.

3.56 Soil Survey* — A systematic study, including classification and mapping of the properties, crop adaptation, and distribution of various soil types.

3.57 Sonne-strip Photograph* — A continuous photo strip in contrast to conventional series of separate and overlapping exposures.

3.58 Stereo-photogrammetry — Stereo-photogrammetry is the interpretation of aerial photographs using a stereoscopic viewing device, which gives a three-dimensional view and creates the illusion that the observer is viewing a relief model of the terrain.

IS : 4410 (Part II) - 1967

3.59 Submergence Survey — This includes collection of data regarding farms, houses and other structures in the area coming under submergence of a project.

3.60 Sub-soil Survey — A systematic study of soil strata, their logging and classification.

3.61 Survey for As-Built Record Drawings* — Surveys to collect the information of any changes, additions, or deletions to that shown on sanctioned drawings or contract drawing which were used for construction of the project or any of its features.

3.62 Survey for Sedimentation Study — The survey or investigation conducted to estimate the probable rate of silting in a storage work.

3.63 Surveys for Structural Behaviour* — Surveys performed after the completion of the structure to determine what distortion, deflection, or other movements take place in the structure as a whole, or its component parts, due to the various loads imposed by the storage of water, temperature change or uplift pressure.

3.64 Terrestrial Photogrammetry* — Photogrammetry with the aid of ground photographs.

3.65 Tie* — A survey connection from a point of known position to a point whose position is desired. A tie is made to determine the position of a supplementary point whose position is desired for mapping or reference purposes, or to close a survey on a previously determined point. To 'tie in' is to make such a connection.

3.66 Tie in — See 3.65.

3.67 Tie Point* — Point of closure of a survey either on itself or on another survey.

3.68 Uncontrolled Mosaic* — A mosaic in which the photographs have not been adjusted by reference to ground control.

3.69 Underground Water Basin* — A valley area or plain, underlain by ground water which has established an operational regime from the prevailing hydrologic and climatic conditions, to behave as a unit and which can usefully be developed as a unit.

3.70 Vertical Control* — A series of bench marks or other points of known elevation, established throughout an area. Also called 'Level Control'.

3.71 Vertical Photograph — An aerial photograph taken with the optical axis of the camera lens pointing vertical; or as nearly as possible, at the time of the exposure.

3.72 Water Resources Appraisal* — Assessment of, with the help of observed data or other known procedures of calculation, an overall picture of the extent, with respect to time and space, and dependability of water supplies surface as well as ground, and the character of water of a river basin, region or country on which an evaluation of the opportunities for their control and utilisation is to be based.

3.73 Water Resources Survey* — An orderly process, including collection of basic data from known records or field studies and observations, methods and techniques used in their collection and interpretation and analysis, to provide basic information for water resources appraisal of a river basin, region or country. It may well include recommendations for improved network of data collecting stations to ensure, providing in so far as possible, data required for water development studies.

4. TERMS RELATING TO DIFFERENT TYPES OF REPORTS

4.1 Completion Report* — A report with corrected drawings prepared as soon as a project is practically in full operation when its estimate of construction should be closed although there may be certain works provided for in the estimate either unfinished or which it is not desirable to construct at once. This report contains all the required financial statements of expenditure and income, classified according to prevailing system of cost accounting, since the authorization of the project, describes the project as constructed bringing out the principal deviations from the sanctioned plans, designs and estimates; deals with the difficulties confronted and how they were met with; mentions and records all other information which may be of use later on. Sometimes when it is not possible to get sanctioned a revised estimate due to paucity of time, the excesses and deviations are explained in the completion report for sanction of the competent authority.

4.2 Construction Progress Report* — A report submitted periodically to the higher or co-ordinating authorities, giving information on the state of construction, operation, significant events affecting construction and construction data.

4.3 Definite Plan Report* — A report, following the project report, presenting the findings and conclusions for such further investigations as are necessary to determine the detailed plan of development for a project, division, or unit. It also includes the design data, plans and dimensions of all structures with specifications ready for construction of the project, division or unit concerned.

4.4 Detailed Integrated River Basin Development Report* — A report, based on detailed investigation, presenting information on (a) the economic, financial and engineering feasibility of the overall plan for the development of the land, water, power, and related resources of the

IS : 4410 (Part II) - 1967

basin; and (b) the relationship of such developments to the area, the region and the nation. The report also deals with existing projects, projects recommended for authorization and construction and projects to be considered for authorization at a later date.

4.5 Geological Report — A report based on the geological information regarding the surface and subsurface of the area. This report may also be supported by laboratory testing.

4.6 Power Planning Report* — A report dealing with the development of power features of a basin, an area, a proposed project, or a supplement of an existing project. It covers hydroelectric generating plant, stand by or peaking facilities; a transmission line or system, or both. It also deals with the optimum development of power and its utilization consistent with prior use of water in conjunction and coordination with other power plants and power systems.

4.7 Power Marketing Report* — A report dealing with the marketing and sale of power including all the pertinent data and analyses related thereto.

4.8 Preliminary Project Report — A report based on preliminary investigations, detailing the feasibility of the project from technical and economic points of view.

4.9 Project Report* — A report, based on detailed investigations, presenting a plan of development for an individual new project, new division of a project, or new supplemental work on a project, an analysis of its economic feasibility and the desirability of undertaking construction of the project works. The report shows how the individual project fits into a desirable basin-wise scheme if a basin plan has not been reported, and presents all facts essential to the authorization of a project. It is accompanied by a technical report of the project, but in case of small project may include the data normally presented in the technical report.

4.10 Project Technical Report or Substantiating Report* — This report, accompanying the project report, presents a discussion of subjects necessary for a thorough understanding of the findings, conclusions and recommendations made in the project report. It presents not only the results of the investigations but also the basis of analysis and computations and references to methods used including designs and estimates.

4.11 Special Purpose Report* — Reports presenting the findings and conclusions of special investigations and studies which are required to satisfy specific requests or legislation, to meet critical problems associated with only one phase of the development of projects under

investigation, or to provide information on specific phases that will be applicable to more than one development. For example, reports on investigation and studies of drainage condition in irrigated and potentially irrigable lands, allocation of construction costs and special market outlet survey.

4.12 Soil Survey Report* — A written report accompanying a soil map describing the area surveyed, the characteristics and capabilities for use of the soil types and phases shown on the map, and the principal factors responsible for soil development.

4.13 Status Report* — An information document summarizing the work performed on an investigation at a given date.

4.14 Sub-basin Report* — A report, based on detailed investigations, and containing similar information as basin report, but confined to only one major tributary area of the basin.

5. TERMS RELATING TO ECONOMIC ASPECTS OF PROJECT PLANNING

5.1 Terms Relating to Works

5.1.1 Deposit Work* — This term is applied to work of construction or repair, the cost of which is met not out of government funds but out of funds from non-government sources.

5.1.2 Emergency Works* — Works that have to be carried out in case of emergency.

5.1.3 Flood Control Work — A work undertaken purely as a protective work against floods.

5.1.4 Local Load Work — This expression indicates work executed by the government on behalf of municipality or other local body, when the cost of the works to form part of a loan given to the local body by the government for the purpose.

5.1.5 Major Work — Works for which capital and revenue accounts are kept.

5.1.6 Minor Work* — Small works for which detailed capital and revenue accounts are not maintained.

5.1.7 Productive Work* — A work, the net revenue from which, after the development period, is sufficient to cover its working expenses and the interest charges on its capital outlay.

5.1.8 Protective Work* — A work undertaken purely as a protective measure against famines and is usually unproductive.

IS : 4410 (Part II) - 1967

5.1.9 Remittance Work* — A work undertaken by executing department on behalf of other government department.

5.1.10 Unproductive Work — A work which yields or will yield revenue which is not or will not be sufficient to cover its working expenses and the interest charges on the capital outlay at rates fixed.

5.2 Terms Relating to Benefits

5.2.1 Betterment Levy — A charge leviable due to increase in the value of land on account of irrigation and other facilities like flood protection or drainage (for reclamation) provided by the project and is levied as a fixed percentage (generally 50 percent) on increased value of land.

5.2.2 Direct Benefits* — These are the values of immediate products and services resulting from the measures for which project and associated costs are incurred. These benefits are also known as primary benefits.

5.2.3 Domestic, Municipal and Industrial Water Benefits* — Benefits based on the cost of the most economical alternative source of water supply (equivalent to revenues plus savings to consumers from lower water rates).

5.2.4 Financial Return — It is the net annual return from an irrigation project expressed as the percentage of the capital cost of the project.

5.2.5 Fish and Wildlife Conservation Benefits* — Benefits based on increased value of annual yields for hunting and fishing in terms of expenditure by sportsmen, and gross market value of commercial fish and fur.

5.2.6 Flood Control Direct Benefits* — This is based on reduction in flood damage to land and other property in terms of cost of restoration to pre-flood condition or reduction in its value and reduced damages to crops in terms of market values adjusted by replanting possibilities and production cost not incurred,

5.2.7 Flood Control Indirect Benefits* — This is based on higher grade use of land formerly flooded in terms of increased earnings, and reduced interruption of business, industry and commerce, traffic, communications and other activities both within and outside the area subject to flooding in terms of net loss of income or added operating costs and cost of evaluation, reoccupation, temporary quarters, emergency flood protective work, and relief and care of flood victims.

5.2.8 Indirect Benefits* — The values added over and above the value of the immediate products or services of the project as a result of

activities stemming from or induced by the project. This is also called secondary benefits.

5.2.9 Induced Benefits* — Profits of all enterprises from supplying goods and services for the increase in farm purchases for family living and production expenses.

5.2.10 Intangible Benefits* — These are benefits which cannot be expressed in monetary terms.

5.2.11 Navigation Benefits* — Direct benefits based on saving to shippers compared to alternate cost, saving in time and operating cost from improvement of an existing waterway, and estimated recreational value of harbours and waterways to small boat traffic. In some cases, indirect benefits from stimulation of business activity.

5.2.12 Power Benefits* — Benefits based on the cost of the most economical alternative source of power (equivalent to power revenues plus savings to consumers from lower power rates).

5.2.13 Primary Benefits — See 5.2.2.

5.2.14 Primary or Direct Irrigation Benefits* — Benefits from irrigation including the value of any reduction in costs due to the project and of any increase of farm products marketed or consumed by the farm family.

5.2.15 Project Benefits* — These are the advantageous effects which involve an increase in the provision of useful goods and services over those to be expected without the project.

5.2.16 Public Benefits* — Benefits in the form of provision of new opportunities for settlement, employment and investment, improved community facilities and services and stabilization of local or original economy.

5.2.17 Recreation Benefits* — Benefits accruing from recreational facilities afforded by a project and are based on judgement evaluations.

5.2.18 Salinity Control Benefits* — Benefits based on value of damage prevented, reduction in costs and increased use similar to flood control.

5.2.19 Sediment Control Benefits* — Benefits based on value of damage prevented, reduction in costs, increased value of services, and value of extended life facilities, for works in a project.

5.2.20 Secondary Benefits or Indirect Irrigation Benefits* — Profits on commodities of projects sold locally, values added by transporting, processing, and distributing the added farm products from the project, plus any value added by other activities stemming from or induced by the project.

IS : 4410 (Part II) - 1967

5.2.21 Social Benefits* — Benefits consisting mainly in opportunities for (a) employment of labour, and (b) employment of capital, as a result of the project during and after construction.

5.2.22 Stemming Benefits* — Benefits in the form of profits earned on commodities of the projects which are sold locally; the profits expected to accrue to all other enterprises between the farmer and the final consumer, from handling, processing and marketing, etc; the increase in income of the governments and other local bodies and public benefits.

5.2.23 Tangible Benefits* — These are the benefits which can be expressed in monetary terms.

5.3 Terms Relating to Costs

5.3.1 Alternative Cost — The cost of the most economical single purpose project which will achieve substantially the same benefits as that is achieved in any specific multipurpose project.

5.3.2 Associated Costs* — The value of goods and services needed, beyond project cost, to make the output of the project available. Also called 'Indirect Cost' or 'Secondary Cost'.

5.3.3 Capital Cost — The total expenditure incurred on a work since the beginning of its constructing to the point of beneficial use, including cost of investigations planning and designs and maintenance during the period of construction. Also called 'Capital Outlay' or 'Outlay'.

5.3.4 Capital Outlay — See 5.3.3.

5.3.5 Common Cost — A term used in cost allocation. It represents the sum which is not obviously allocable to one or the other function and is appropriated on some rational arbitrary basis.

5.3.6 Cost Allocation — Apportionment or allocation of cost of a multipurpose project to different purposes.

5.3.7 Direct Cost — The cost of such features or portions of the project which are built for exclusive use of a purpose. Also called 'Specific Cost'.

5.3.8 Indirect Cost — See 5.3.2.

5.3.9 Intangible Costs — These are costs which cannot be estimated in monetary term.

5.3.10 Joint Cost — Joint cost is the cost of project features or facilities used for two or more functions and as such can not be directly traced and assigned to a single purpose. This represents that portion of

the cost of the project which remains to be distributed after the total of 'separable' or 'specific costs' for different project functions has been deducted from the cost of the multiple purpose project.

5.3.11 Outlay — See 5.3.3.

5.3.12 Project Costs* — These are the values of goods and services used to investigate, establish, maintain and operate a project.

5.3.13 Secondary Cost — See 5.3.2.

5.3.14 Separable Cost* — The difference between the cost of a multiple-purpose project and the cost of the project with the purpose omitted. It comprises direct or specific costs as well as all added costs, if any, of increased size of structures and changes in design for a particular purpose over that required for all other purposes, such as the cost of increasing reservoir storage capacity.

5.3.15 Specific Cost — See 5.3.7.

5.3.16 Tangible Cost — These are costs which can be estimated in monetary terms.

6. TERMS RELATING TO ESTIMATES

6.1 Abstract* — A bill of quantities of various items in which pieces or work of same sort and having the same unit or price and measurement are collected under one description or a summary of the cost of different heads and detailed heads into which a work might have been divided and sub-divided. When an abstract shows only quantities of various items it is called the 'abstract of quantities'. When it shows the rate and amounts it is called the 'abstract of cost'.

6.2 Abstracting* — The process of collecting together pieces of work of same sort having the same unit of price and measurement.

6.3 Administrative Approval* — The formal acceptance by the department concerned of a proposal to incur expenditure on works initiated by, or connected with, the requirements of that department.

6.4 Analysis of Rates* — Calculation of price of a unit of any item of work by breaking down the elements of costs involved in it, for example, in calculating cost of a unit of reinforced concrete, the elements of cost involved are stone ballast, sand, cement, water, centring or shuttering, steel carriage bending and binding, mixing, transporting, laying, tamping, curing, striking of forms, contractor's profit, etc.

6.5 Audit and Account Charges* — Provision in estimates for the expenses to be incurred on auditing and maintaining the accounts of the expenditure, payments, etc of a work.

IS : 4410 (Part II) - 1967

6.6 Bill of Materials* — A list of the various types of materials required for a construction, either proposed or completed, giving dimensions and weights or other quantitative measurements.

6.7 Compensation Payments* — Payments made or to be made to a person or persons whose property is flooded or is to be flooded; who are or are likely to be otherwise adversely effected by the project, or whose property is to be acquired for benefit or locating the works.

6.8 Competent Authority* — Government or any other authority to whom the relevant powers have been or may be delegated by government.

6.9 Construction Cost Index* — The ratio of the current cost of constructing an element of construction to the cost of constructing the same element of construction at some previous time.

6.10 Construction Estimate — *See 6.23.*

6.11 Contingency Reserve or Contingencies — A provision in the estimate as a percentage of the total estimate made for such incidental expenses of a miscellaneous character which cannot appropriately be classified under any distinct subhead or subwork yet pertain to the work as a whole. This provision may be utilized to cover small extra expenditure due to minor changes in design or estimate.

6.12 Degree Estimate* — A guess estimate based on studies from index maps and not on hand rules, but on experience of cost of previous work of the same type built elsewhere.

6.13 Estimate* — A statement showing the probable cost of a proposed work, and generally comprising a report, plans, specifications and a statement of measurements, with an abstract showing the total estimated cost of each item.

6.14 Estimating* — The process of preparing an estimate.

6.15 Estimator* — One who prepares estimates.

6.16 First Revised Estimate — *See 6.29.*

6.17 Head and Sub-heads — In the accounts of works and of the working estimates the term is used to describe the division and sub-division into which the cost of work is divided for the purposes of financial control and statistical conveniences. Thus for the purpose of financial control the appropriation made under each major head of account is divided in the subordinate heads

6.18 Major Estimate* — A term applied to the estimate for a work, when sanctioned amount of the works expenditure exceeds a specified amount. This term is also applied, for the sake of convenience, to the work itself.

6.19 Market Rates — The term is used in respect of an article borne on the stock accounts and indicates the cost per unit at which the article can be procured, at a given time, from the public markets.

6.20 Minor Estimate* — A term applied to the estimate for a work, when the sanctioned amount of the works expenditure exceeds a specified amount. This term is also applied, for the sake of convenience, to the work itself.

6.21 Minor Head* — A sub-division of the unit of project according to nature of expenditure involved or to be incurred.

6.22 Piece Work* — Work carried out on work order or a method of payment of hired labour wherein payment is made not by a fixed wage but *pro rata* on the number of articles completed.

6.23 Pre-construction Estimate* — Estimates based on quantities calculated as in project estimates but on rates tendered by contractors. The actual cost called 'Construction Estimate' may still be different from the estimated cost, on account of unpredictable conditions being met in foundations, accidents, fluctuations in prices of commodities due to changes in world markets, alteration in custom duties, etc.

6.24 Pre-design Estimate* — A calculated estimate based on comparatively more detailed surveys, that is, an estimate prepared after the foundations had been probed, project drawings prepared and discharges and lengths of channels calculated.

6.25 Preliminary Estimate* — Estimate based on rough survey and very comprehensive unit rate, for example, an estimate of a reservoir based on a cross-section without any foundation exploration, and the estimate of the canal system based on area for irrigation.

6.26 Project Estimate* — An approximate estimate based on full detailed surveys and investigation; for example, an estimate prepared after detailed foundation explorations, surveys over extensive areas for construction materials, alignments and longitudinal sections of channels, detailed designs of works, etc, had been completed. In this case too, although the quantities would be forecast with sufficient accuracy, rates of cost which get affected by a variety of unpredictable factors still remain flexible to a large extent.

6.27 Rate or Unit Price* — In estimates of cost, contract, contractors' bills and vouchers generally, rate means the consideration allowed for each unit of work, supply or other service.

6.28 Reconnaissance Estimate — Estimate based on thumb rules and estimating curves.

6.29 Revised Estimate* — Estimate of a work submitted when an original sanctioned estimate is likely to be exceeded by more than a specified

IS : 4410 (Part II) - 1967

or fixed percentage. If in the revised estimate an excess is anticipated over the sanctioned amount, a 'Second Revised Estimate' is submitted. The former is then described as 'First Revised Estimate' in the completion report of the work.

6.30 Schedule of Rates* — Schedule specifying rates for carriage of different materials, different types of labour and of various items of work (materials and labour separately as well as combined) according to the market prices prevailing in a locality.

6.31 Secondary Investments* — Investments generally recoverable from the beneficiaries in agriculture, industry, mining and other fields, for utilizing the water and power to be supplied by the project.

6.32 Second Revised Estimate — *See 6.29.*

6.33 Supplementary Estimate* — An estimate covering any development of a work thought necessary while the work is in progress which is not fairly contingent on the proper execution of the work first sanctioned. This supplementary estimate is accompanied by a full report of the circumstances which rendered it necessary. The abstract must show the amount of the original estimate and the total of the sanction required including the supplementary amount.

6.34 Technical Sanction* — The sanction of the competent authority to a properly detailed estimate of the cost of a work of construction or repair or investigation.

6.35 Tools and Plants* — Scientific instruments, drawing materials, plant and machinery, tools, navigation plant, camp equipage and livestock for construction, maintenance and operation of a project.

6.36 Units of Projects* — A primary minor head under which a group of individual works in a project are arranged to facilitate preparation of estimates, financial control and statistical convenience, that is, a multipurpose project may be split up into unit 1 (dam and appurtenant works), unit 2 (irrigation, embankments and drainage works), unit 3 (hydro-electric installations) and so on.

6.37 Use Rate of Equipment — It is the hourly charges of a machine used for any work; the rate being used in the analysis of rates.

6.38 Works Abstract — This is the abstract of the account of all the transactions relating to each particular work (estimate) during a month either in cash or other charges.

7. TERMS RELATING TO CONTRACTS

7.1 Acceptance — A written agreeing by the contracting officer to the offer or bid of a bidder for doing a particular work.

7.2 Advance Payment* — Payment made on a running account to a contractor for work done by him but not measured.

7.3 Agreement* — That part of the contract which formally binds the parties to fulfil their respective obligations.

7.4 Bid — *See 7.76.*

7.5 Bid Bond, Bid Guarantee or Earnest Money* — Bond submitted with the bid to guarantee that the bid has been made in good faith and the bidder will enter into contract if his proposal is accepted; further it also guarantees that he will furnish performance and payment bonds.

7.6 Bidder* — Any individual, firm or corporation submitting a bid for the work contemplated, acting directly or through a duly authorized representative.

7.7 Bill of Quantities* — An analytical and detailed statement of the different items of work, labour and materials which will be necessary for the proposed work.

7.8 Combined Lump-Sum and Unit-Price Contract* — A contract in which lump-sum payment is made for some of the items of work, the cost of which can be definitely estimated, and unit-price payment for such other items for which the total amount of work cannot be definitely determined at the time when the construction has begun.

7.9 Competitive Bid Contract* — Contracts awarded and drawn after inviting bids publically and considering bids received from all those who are interested in bidding.

7.10 Completion Certificate* — (a) A certificate recorded on the drawing(s) of an individual work or group of works that the work(s) has (have) been completed according to dimensions and details given on the drawing(s). (b) A certificate given by the engineer-in-charge of the work on the basis of which the final payment is made to the contractor.

7.11 Conditions of Contract* — The terms upon which a contract is awarded.

7.12 Constructional Risk* — This term refers to all the various costs which cannot be accurately forecast and depends on the type of contract or work.

7.13 Consumable Stores* — Anything brought on to site for certain work, which, by virtue of that work, becomes unusable upon completion of the contract.

7.14 Contract — The written agreement executed between the department or other authority promoting the work on one hand and the

IS : 4410 (Part II) - 1967

successful bidder or contractor on the other by which the latter is bound to perform the work or furnish the labour and materials within the prescribed period and the former is obligated to compensate him therefore at the mutually established and accepted rate or price.

7.15 Contract Documents* — These comprise all the documents relating to the construction of a proposed engineering work and include form of contract, general conditions of contract, specifications, bill of quantities, schedule of prices or rates, contract drawings, form of tender and the preliminary programme chart.

7.16 Contract Drawings* — Drawings listed in the specifications under the title contract drawings and include any future changes and revisions of said drawings.

7.17 Contracting Officer* — The person executing the contract on behalf of the government, quasi-public bodies, etc, and any other officer or civilian employee who is a properly designated contracting officer; and the term includes except as otherwise provided in the contract, the authorized representative of a contracting officer acting within the limit of his authority.

7.18 Contractor — An individual, firm, company or syndicate undertaking the execution of the work under contract and acting directly or through agents or employees.

7.19 Contractor's Warranty — The contractor's warranty means the warranty as submitted by him in regard to his complete understanding of the nature and the conditions of the work and the contract.

7.20 Cost Plus or Cost Reimbursement Contract — A contract in which the contractor is reimbursed the actual cost incurred by him in the execution of the work including charges for the use of plant and other items having a residual value, insurance charges, etc, plus a fee which may be a fixed sum, a percentage or some fluctuating amount according to the agreed conditions.

7.21 Cost Plus Fixed Fee Contract* — A contract which provides for a fixed fee to be paid to the contractor irrespective of the final cost of the work. The fee is determined by the nature of the work and its estimated cost.

7.22 Cost Plus Fixed Fee Plus Bonus Penalty Contract — A contract, which, in addition to the fee also provides an incentive to the contractor, to reduce the time of construction to a minimum, in the shape of a bonus for each day on which the owner has full use of completed work before the originally estimated date of completion. The contract also provides for the assessing of a fixed amount as liquidated damages against the

contractor for each day after the originally estimated date of completion required by the contractor to finish the work.

7.23 Cost Plus Percentage Contract* — A contract in which the contractor is paid profit on the basis of a fixed percentage of the actual cost of the work.

7.24 Date of Completion — The actual date on which the works are physically completed at site as specified in the contract.

7.25 Day-labour System, Force Account System, Day-work System or Hired-labour System* — Management and supervision of the construction work directly by the entrepreneurial agency.

7.26 Discrepancies* — Refers to any differences between the scaled dimensions on the contract drawings, to differences between the information given on the drawings and the specifications, and to any other ambiguities that may have crept into the contract documents.

7.27 Excepted Risks — War hostilities (whether war be declared or not), invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war or (otherwise than among the contractor's own employees) riot, commotion or disorder or use or occupation by employer of any portion of the works in respect of which a certificate of completion has been issued or a cause solely due to the engineer's design of the works or any such operation of the forces of nature as reasonable foresight and ability on the part of the contractor could not foresee or reasonably provide against.

7.28 Extra Items — Items not covered by the schedule of bid in the contract.

7.29 Final Payment* — The last payment on a running account made to a contractor on the completion or determination of his contract and in full settlement of the account.

7.30 Final Measurements* — Measurements of the materials, bills of quantities and services after the work has been completed. They form the basis for making payment for works as executed.

7.31 Fixed Price Contract — A contract in which the price is fixed in advance but is subject to adjustment to allow for variation from the work as provided in the contract drawings and specification during execution.

7.32 Force Majeure — Irresistible compulsion or coercion, war, strike, act of God etc, excusing fulfilment of contract.

7.33 Form of Contract* — A formal agreement on specified form, which becomes binding between the contracting officer and the contractor, when it has been properly signed, sealed and witnessed.

IS : 4410 (Part II) - 1967

7.34 General Provisions (Specifications)* — Provisions in the specifications which apply to the work as a whole.

7.35 Guarantee Period — See 7.43.

7.36 Incorporation by Reference* — Including as an official part of the contract, drawings, reference specifications or other data, by referring to known building codes, departmental manuals, standard specifications, standard designs and even previously executed contracts.

7.37 Intent Notice* — It is a notice disclosing intention of an organisation of putting a particular work to tender. Such notice is given for very big works, in advance of regular tender notice, so that intending tenderers can make advance enquiries, planning, etc for the work.

7.38 Invitation to Bid — Advertisement inviting bids for works or materials mentioned therein. It will indicate the nature and location of the work to be done or the materials to be supplied, the price and date of issuing tender documents and the name of the issuing authority, the last date of receiving tenders and the name of the receiving authority and the date and time of opening them. Information about the estimated cost and the amounts of earnest money may also be given. Also called 'Tender Notice'.

7.39 Item Rate Contract — A unit price contract in which the bidder enters the unit price against each item.

7.40 Labour Records* — Records relating to all labour employed on the site, the trades and classifications, number of men, periods of engagement, idle time and the comparison between labour required and available throughout the period of contract.

7.41 Liquidated Damages* — A fixed sum agreed upon at the outset of a contractual arrangement, as the proper compensation to be paid to the injured party in the event of breach.

7.42 Lump-Sum Contract — A fixed price contract in which the contractor agrees to carry out all the works shown on the drawings and described in the specification for a fixed lump-sum subject to adjustment to allow for variation during execution.

NOTE — A lump-sum contract may also be entered into when the contractor bids on the basis of his own design as in the case of a package job contract.

7.43 Maintenance Period* — The period after the completion of the construction of work during which the contractor is responsible for making good the repairs or damage that may occur to the work during its operation. The contractor is entitled to final payment and or refund of security only after the expiry of this period. Also called 'Guarantee Period'.

7.44 Malkana — This is levy for use of minerals to be paid to the owner of the land.

7.45 Material Records* — Records relating to all materials used on the site, date of arrival, the period of store, the date of permanent location, and the dates when requisitions were made for their supply.

7.46 Negotiated Contract* — Contract awarded to a selected tenderer or bidder after a study of the qualifications, previous experience and facilities of one or more tenderer.

7.47 On-costs* — Costs made up by listing the actual cost to the contractor of all the preliminaries and ancillary work, such as the transport, erection and dismantling of all site buildings and of all plants and materials.

7.48 Package Job or Turn-Key Contract* — A contract in which the government or organisation undertaking a construction project makes only one party responsible for all services connected with the work, including planning, design, drawing of specifications and construction. This type of contract may be made either on a firm price or on cost plus basis. It is based on a functional type of specification describing the general features and requirements of the finished plant. The contractor draws up all the detailed engineering designs and specifications, and performs the construction and testing. The work is considered complete when he turns over the plant in satisfactory operation to the owner.

7.49 Percentage Rate Contract — A unit price contract in which the contracting officer has already shown the unit price against each item in the schedule and the bidder quotes a percentage above or below the schedule rates which percentage is applicable to all the items.

7.50 Partial Payments — See 7.65.

7.51 Partial Performance* — This term conveys the idea of performance which while sufficient to confer appreciable benefit on the recipient falls short of the concept of substantial, or virtually complete, performance.

7.52 Part Rate — The rate at which running payments are made for items of work which are not then complete as per specification. Reduction in payment is to the extent the contractor has to spend for completing the item as per specifications.

7.53 Payment Bond — This bond guarantees that the contractor will pay all bills and obligations incurred under the contract, thus rendering the owner harmless from claims and liens which might be filed after the completion of the work and after all payment had been made to the contractor.

IS : 4410 (Part II) - 1967

7.54 Payment on Account — See 7.65.

7.55 Permanent Structure* — All construction, installations, materials, structures and equipment that are required to be left intact by the contractor at the construction site after the completion of the contract.

7.56 Piece Work* — (a) Work carried out on work order, or (b) a method of payment of hired labour wherein payment is made not by a fixed wage but *pro rata* on the number of articles completed.

7.57 Plant* — All mechanical aids which the contractor will be required by the executing agency or contractor to carry out the works.

7.58 Plant Records* — Records showing the number and type of mechanical aids used on the site, together with the period of working, idle time, and time spent on repairs and maintenance, and the estimated value of the plant at the time of its arrival at the site.

7.59 Recoverable Payment* — A payment to or on behalf of a contractor which does not represent value creditable or payable to him for work done or supplies made by him and has, therefore, to be made good to the executing authority by an equivalent cash recovery or short payment of dues.

7.60 Reduced Rate — The rate at which final payments are made for items executed short of specifications and still considered acceptable from consideration of strength, safety, etc. The reduction in rate is to the extent the contractor has saved in material and labour plus some penalty for not observing the specifications.

7.61 Rise and Fall Clauses — Clauses sometimes provided in a fixed price contract to allow adjustment of contract price by reason of alteration in rates of wages and allowance payable to labour and local staff; change in conditions of employment of labour and local staff; change in cost of materials for permanent or temporary works or in consumable stores, fuel and power; variation in freight and insurance rates; customs or other import duties; the operation of any law, statute, etc.

7.62 Risks — The risks of injuries, (including wrongful death) and damages, directly or indirectly to the government, their agents, their employees and to their property arising out of or in connection with the performance of the work.

7.63 Royalty* — A fee paid to a proprietor or to a person or agency holding a patent.

7.64 Running Account* — A term applied to the account with contractor when payment for work or supplies is made to him at convenient intervals subject to final settlement of the account on the completion or determination of his contract.

7.65 Running Payments, Payment on Account, Partial Payments or Progress Payments* — Payments made to the contractor from time to time during the course of the work. The amount of the running payment may be less than the amount due to the contractor for the work done, as per tendered rates.

7.66 Running Measurements or Intermediate Measurements* — Interim measurements of materials, bills of quantities, services while the work is in progress, for purpose of making running payments to the contractor as well as to record progress and details of work done. The running measurement is to be accounted for at the time of making final measurements,

7.67 Secured Advance* — A term applied specifically to an advance made on the security of materials brought to site of work, to a contractor whose contract is for the completed items of work.

7.68 Security Deposit — A deposit, in cash or other securities as approved by the authority, required to be furnished by a contractor, to enable cash recovery in the event he breaches terms of contract. The deposit is payable in advance or by installments as the work progresses.

7.69 Site Clearance or Clearing Up* — Upon completion of the work, removal by the contractor from the vicinity of the work all plants, buildings, rubbish, unused materials, concrete forms, and other like material, belonging to him or used under his direction during construction. In the event of his failure to do so, the contracting officer may have them removed at the expense of the contractor, and his surety or sureties shall be liable therefor.

7.70 Specifications* — A written, typed or printed description of work to be done, forming part of the contract and describing qualities of material, mode of construction, and also giving dimensions and other information not shown in the drawings, as may be necessary for the proper performance of the contract.

7.71 Specific Performance* — Work under a construction contract completed exactly in accordance with the plans and specifications and paid for at the contract price constitutes specific performance by both parties and terminates the agreement.

7.72 Sub-contract* — An agreement between a contractor and a sub-contractor under the terms of which the latter undertakes to handle for the former a particular portion of the work which the former has become obliged to perform.

7.73 Sub-contractor* — Anyone (other than the contractor) who performs work at the construction site directly or indirectly for or on behalf

IS : 4410 (Part II) - 1967

of the contractor other than or in addition to the furnishing of materials, equipment, and plant, but this term does not include one who furnishes only his personal labour or his own services.

7.74 Substantial Performance* — Performance is said to be substantial when, due to conditions beyond the control of either party, specific performance is impossible but one party has performed his obligation to substantial completion and is entitled to receive payment in full or with minor deduction, provided that no damage is suffered by the other party.

7.75 Temporary Works or Temporary Structures* — Constructions of any kind which have to be built by the contractor for the purpose of executing permanent works and are dismantled afterwards.

7.76 Tender or Proposal* — A written offer usually with an earnest money from a contractor to undertake a work for a certain sum of money. The tender will relate to all conditions set out in the contract documents and upon its acceptance brings all these conditions into force. Also called 'Bid'.

7.77 Tender Notice — See 7.38.

7.78 Time Limit — A limit of time set in the tender agreement for completing the work covered by the agreement.

7.79 Transfer of Contract — When the contractor transfers full or a part of contract work, with the permission of the authorities with whom he has entered into contract, to another contractor.

7.80 Unit Price Contract* — Contract in which the payment for the work is to be made upon the basis of the computed quantities of specifically stated items of work actually performed and materials furnished and used by the contractor in the project, each such quantity being multiplied by the contractors' bid for that unit.

7.81 Variation in Prices and Cost of Living Index — Variations in prices to be paid to or deducted from the contractor in relation to the increase and decrease in prices of materials, and living index as existing on a specific date as mentioned in the project.

7.82 Work Orders* — An agreement on a standard form which contains only a description of the work to be done and the rate to be paid for it. Reference to the total quantity to be executed or to the time within which it is to be executed may or may not be given. It, however, is accompanied with a specification of the work.

7.83 Work Slips Form* — A specified form which the executing officer may submit to the higher authority at regular intervals, or when considered necessary, reporting cases of probability of excess of actual over estimated cost of work with necessary explanation so as to enable the higher authority to pass order on the case, on the occurrence or the probability of the occurrence of any irregularity in the rate or cost.

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